

Integrating Mitigation into National Sustainable Development Strategy – Using the Sustainomics-based Action Impact Matrix (AIM) Approach

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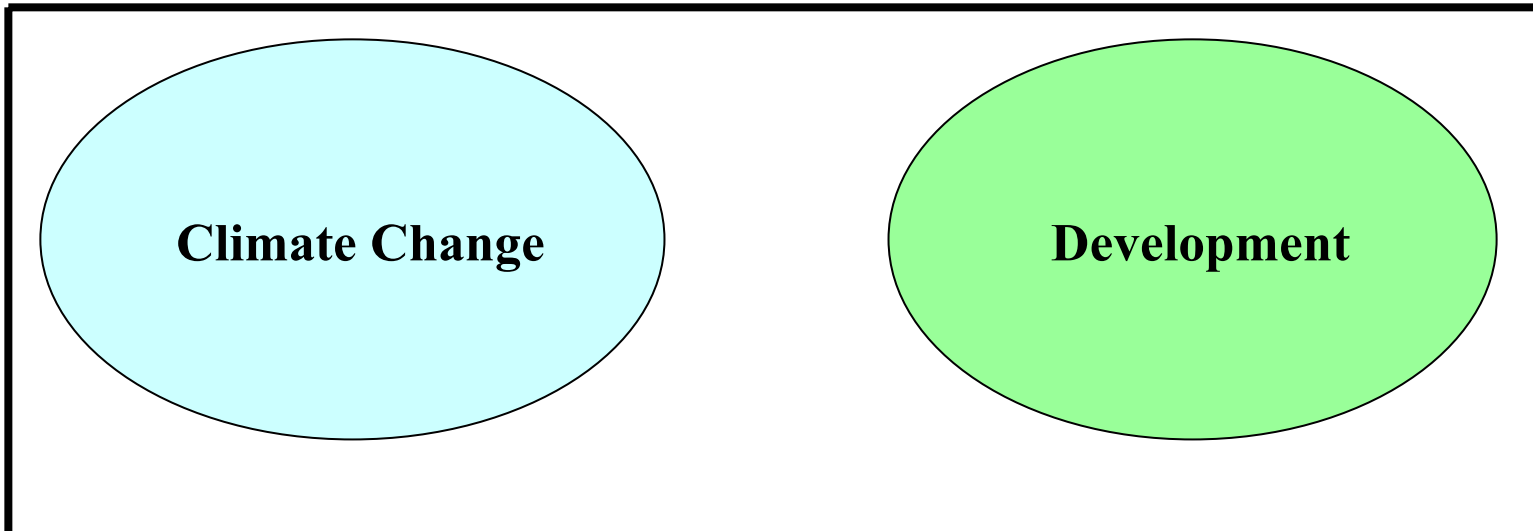
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- 1. Brief overview of methodology**
- 2. Action Impact Matrix (AIM)
process and application**
- 3. Post-AIM analysis of macro-
and micro-linkages**

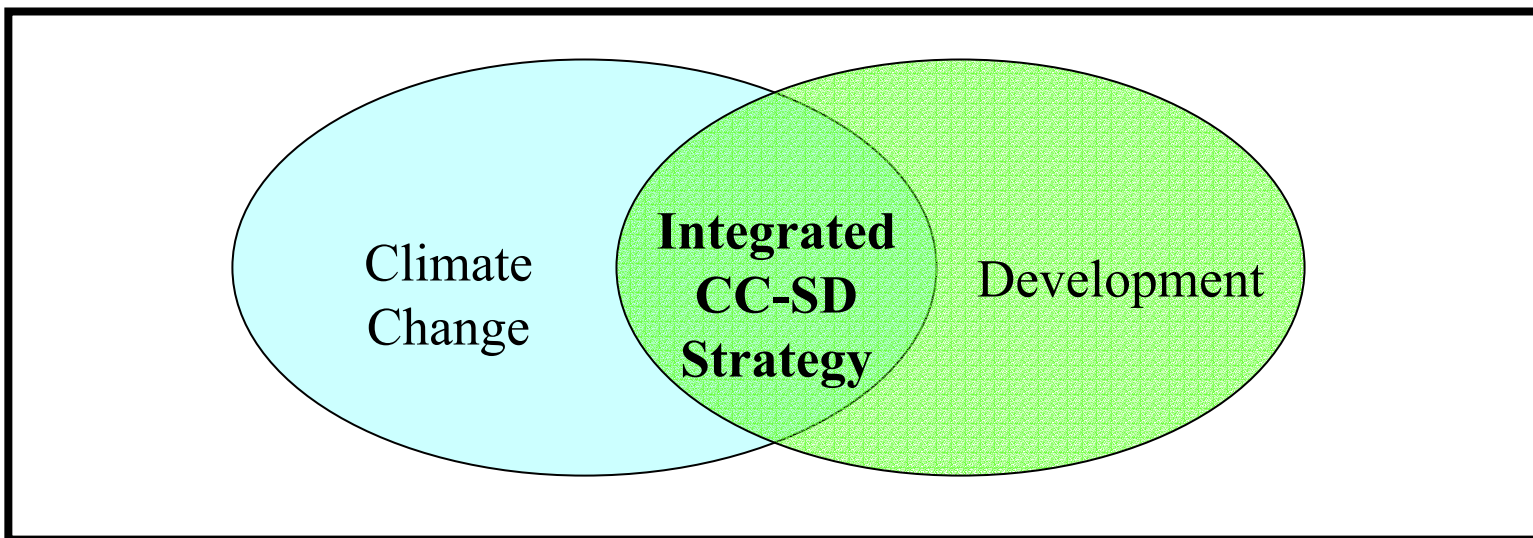


1. Brief overview of methodology





Former Viewpoint – AR1



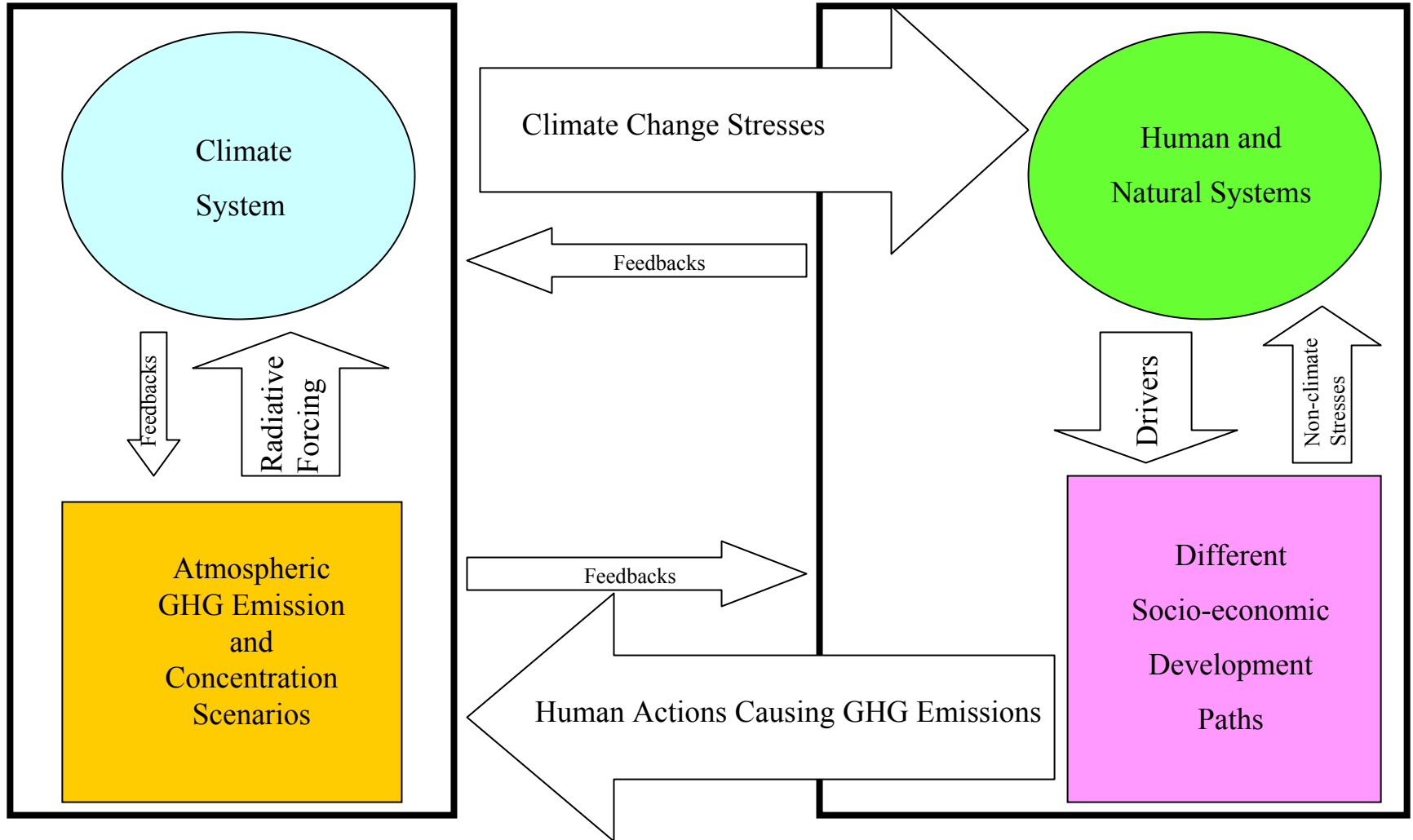
Desired Viewpoint (policy relevant) – AR4



SD-CC cyclic links

Climate Domain

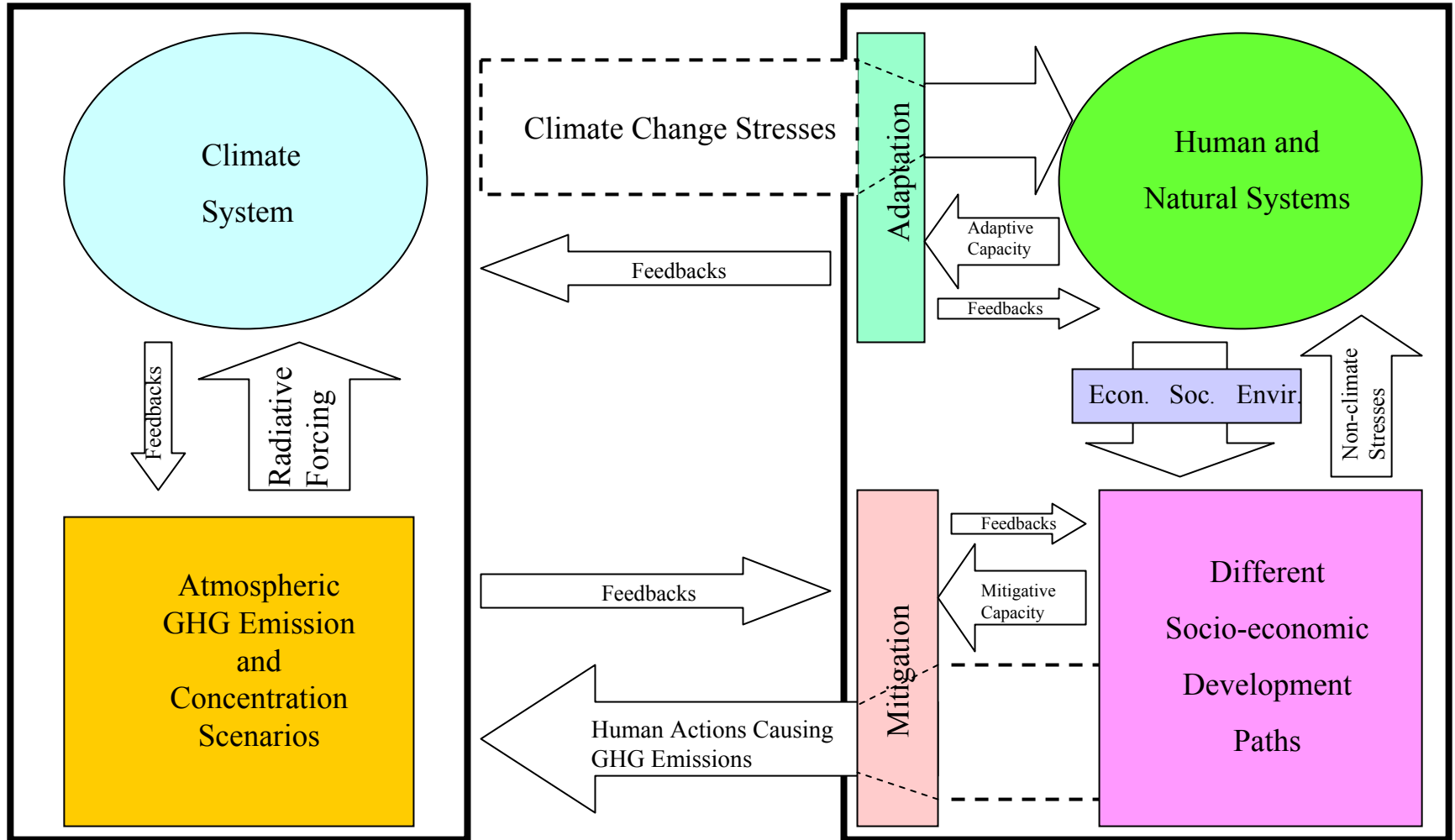
Sustainable Development
Domain



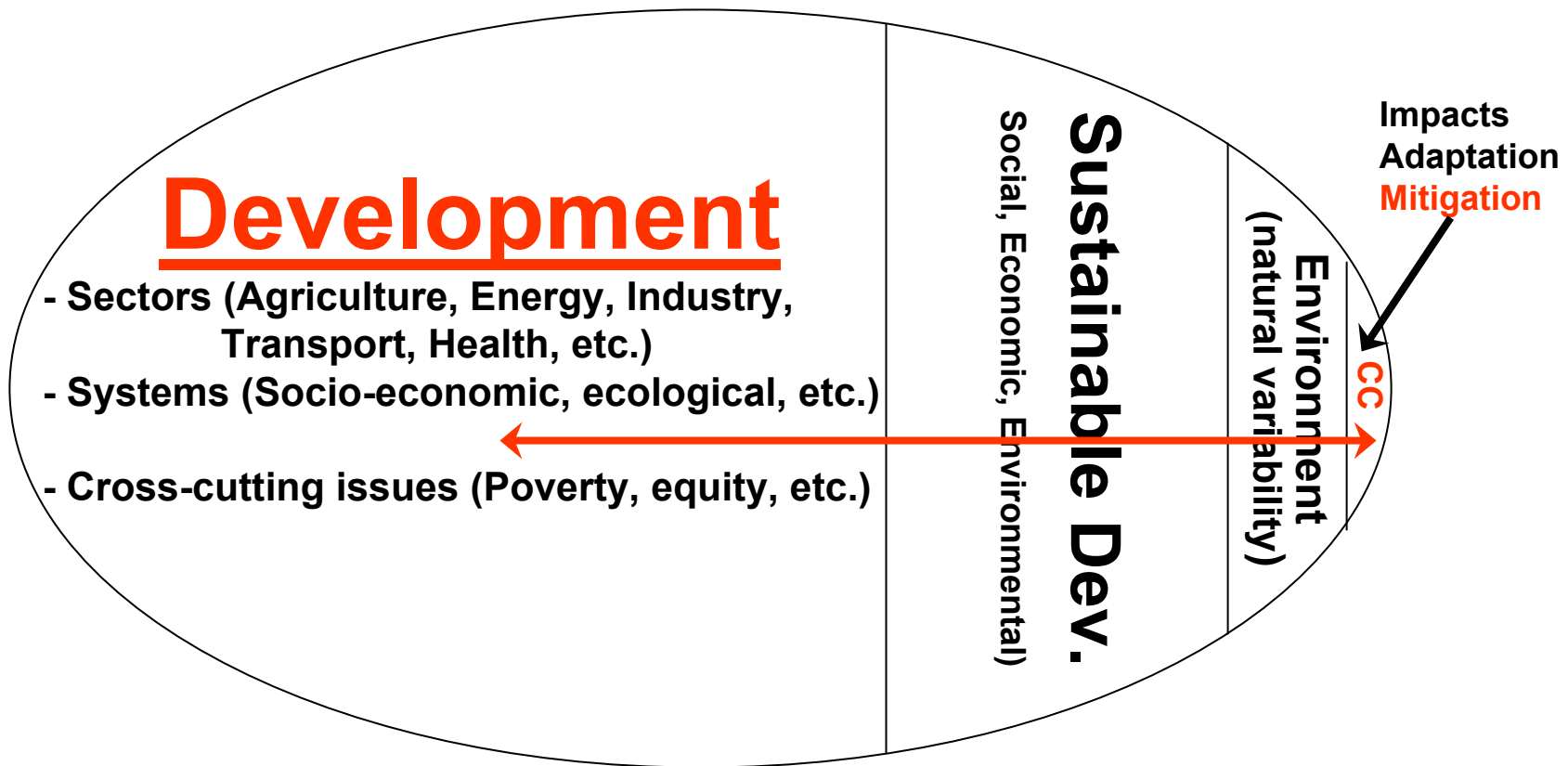
SD-CC cyclic links

Climate Domain

Sustainable Development
Domain



AIM Challenge: Linking CC response to National Development



Action Impact Matrix (AIM) Methodology

The AIM methodology may be used to better understand interactions among key elements, at the country-specific level:

- (a) national sustainable development policies and goals;**
- (b) climate change responses (adaptation and mitigation).**

The AIM approach analyses key economic-environmental-social interactions to identify potential barriers to making development more sustainable (MDMS) - including climate change. It also helps to determine high priority macro strategies and micro policies in economic, environmental and social spheres, that facilitate implementation of climate change adaptation and mitigation to overcome the effects of climate change.

Thus, the AIM helps to integrate CC within SD. It has been used since the early 1990s to link macroeconomic policies and environment.

AIM is based on Sustainomics Principles

The AIM methodology is based on the sustainomics framework [1], which draws on the following principles:

1. **MDMS approach** – sustainable development is defined as a process (rather than an end point), while the step-by-step approach of “making development more sustainable” (MDMS) becomes the prime objective.
2. **Sustainable development triangle** - SD is viewed through three main domains or perspectives: social, economic and environmental.
3. **Trans-boundary approach** – analysis transcends conventional boundaries imposed by discipline, space, time, stakeholder viewpoints, and operability.
4. **Full cycle application of integrative tools** – Action Impact Matrix (AIM) is the key link from initial data gathering to practical policy application and feedback.

[1] Proposed at 1992 Rio Earth Summit - see Munasinghe (1992) and Munasinghe (2002).



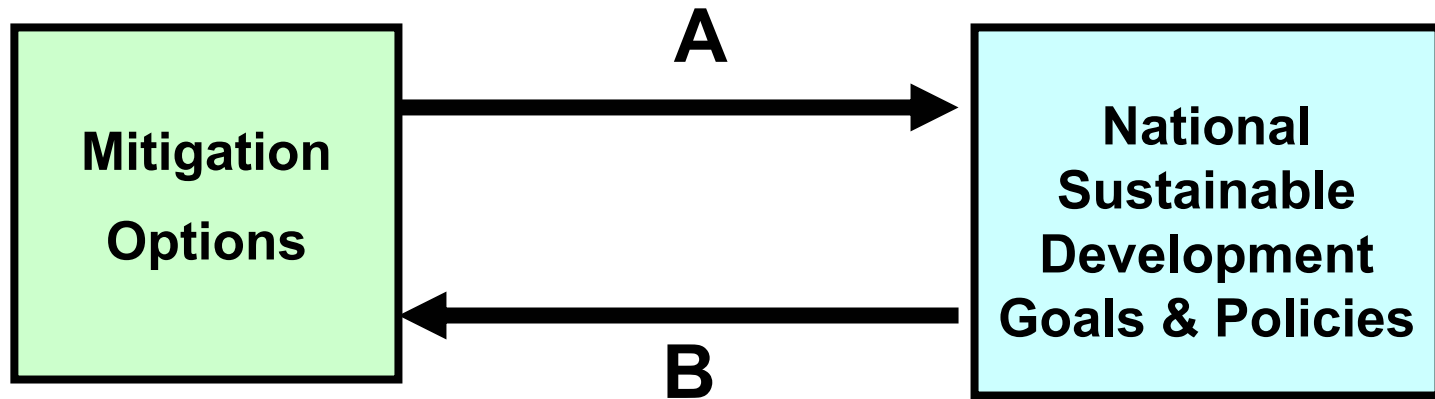
2. Action Impact Matrix (AIM) process and application



AIM Process

The AIM methodology relies on a **fully participative stakeholder exercise** to generate the AIM itself. Up to 35 experts are drawn from government, academia, civil society and the private sector, who represent various disciplines and sectors relevant to both sustainable development and climate change. In the initial exercise, they usually interact intensively over a period of about two days, to build a preliminary AIM. This participative process is as important as the product (i.e., the AIM), since **important synergies and cooperative team-building activities emerge**. The collaboration helps participants to better understand opposing viewpoints, resolves conflicts, and ultimately facilitates implementation of agreed policy remedies. On subsequent occasions, the updating or fine-tuning of the initial AIM can be done within a few hours by the same group, since they are already conversant with the methodology.

Basic two-way link between Development and Mitigation



Mitigation AIM methodology

- 1. Determine the most important national goals and policies.**
- 2. Determine key mitigation options for climate change**
3. Identify how goals/policies might affect mitigation options
4. Identify how mitigation options might affect goals/policies.
5. Identify impacts of climate change on mitigation options and on national development goals and policies
6. Prioritize most important interactions and determine appropriate remedial policies and measures (preliminary AIM).
7. Perform more detailed studies and analysis of key interactions and policy options identified in step 6 above.

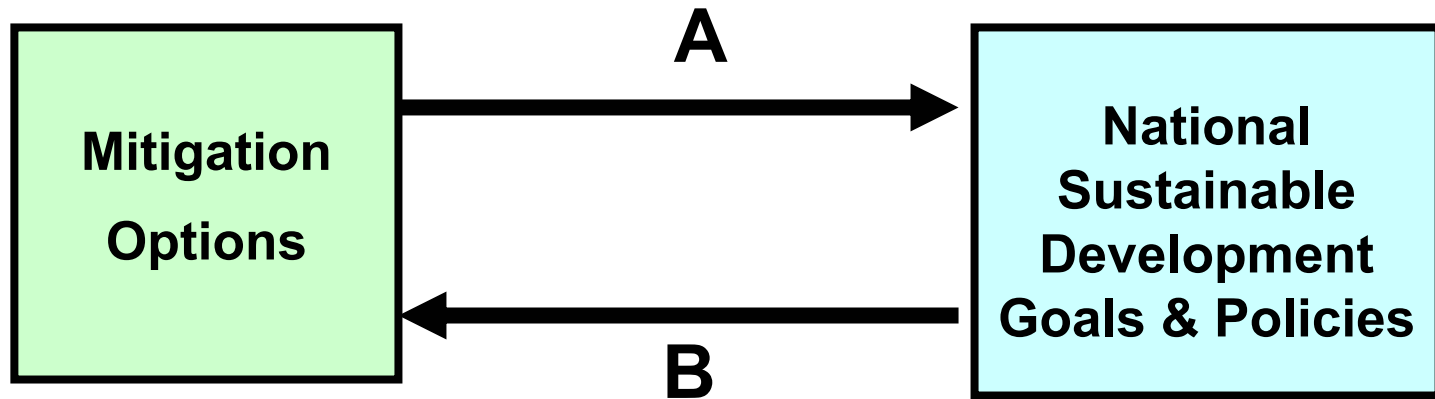
Build the AIM – Steps 1 & 2: Identify Rows and Columns

Row Headings: key national development goals and policies.

Column Headings: key mitigation options.

		<u>MITIGATION OPTIONS</u>			
		Electricity		Transport	Land Use
		(1) Demand Side Management	(2) Renewable Energy	(3) Fuel Substitution	(4) Forestry
<u>DEV. GOALS/POLICIES</u>					
(A)	Growth				
(B)	Poverty alleviation				
(C)	Food Security				
(D)	Employment				

Two matrices (MED and DEM) to explore two-way Development-Mitigation Linkages



MED-AIM = Effect A

(Mitigation Effects on Development)

DEM-AIM = Effect B

(Development Effects on Mitigation)

Mitigation AIM methodology

1. Determine the most important national goals and policies.
2. Determine key mitigation options for climate change
- 3. Identify how mitigation options might affect development goals/policies (MED)**
4. Identify how goals/policies might affect mitigation options
5. Identify impacts of climate change on mitigation options and on national development goals and policies
6. Prioritize most important interactions and determine appropriate remedial policies and measures (preliminary AIM).
7. Perform more detailed studies and analysis of key interactions and policy options identified in step 6 above.

Build the AIM – Step 3: Fill in MED matrix

Intensity of linkage and text description

KEY + is good - is harmful 3 = High 2 = Moderate 1 = Low		MITIGATION OPTIONS			
		Energy		Transport	Land Use
		(1) Demand Side Management	(2) Renewable Energy	(3) Fuel Substitution	(4) Forestry
<u>DEV. GOALS/POLICIES</u>					
(A)	Growth				
(B)	Poverty alleviation				+1 [reason]
(C)	Food Security				
(D)	Employment				

Matrix MED:

Reasons for numerical values assigned
(usually several text pages including references)

Example of brief description

Cell B4: Net Value = +1

[+2] Gains: Forestry projects would help in poverty alleviation by providing employment to the rural poor.

[-1] Losses: Forestry projects may take away valuable agricultural land which could also generate income for poor people



Mitigation AIM methodology

1. Determine the most important national goals and policies.
2. Determine key mitigation options for climate change
3. Identify how mitigation options might affect goals/policies
- 4. Identify how development goals/policies might affect mitigation options (DEM)**
5. Identify impacts of climate change on mitigation options and on national development goals and policies
6. Prioritize most important interactions and determine appropriate remedial policies and measures (preliminary AIM).
7. Perform more detailed studies and analysis of key interactions and policy options identified in step 6 above.



Build the AIM – Step 4: Fill in DEM matrix

Intensity of Linkage and Text Description

KEY + is good - is harmful 3 = High 2 = Moderate 1 = Low		MITIGATION OPTIONS			
		Energy		Transport	Land Use
		(1) Demand Side Management	(2) Renewable Energy	(3) Fuel Substitution	(4) Forestry
<u>DEV. GOALS/POLICIES</u>					
(A)	Growth	-1 -2 demand growth +1 efficiency gain			
(B)	Poverty alleviation				
(C)	Food Security				
(D)	Employment				



Matrix DEM:

Reasons for numerical values assigned
(usually several text pages including references)

Example of brief description

Cell A1: Net Value = -1

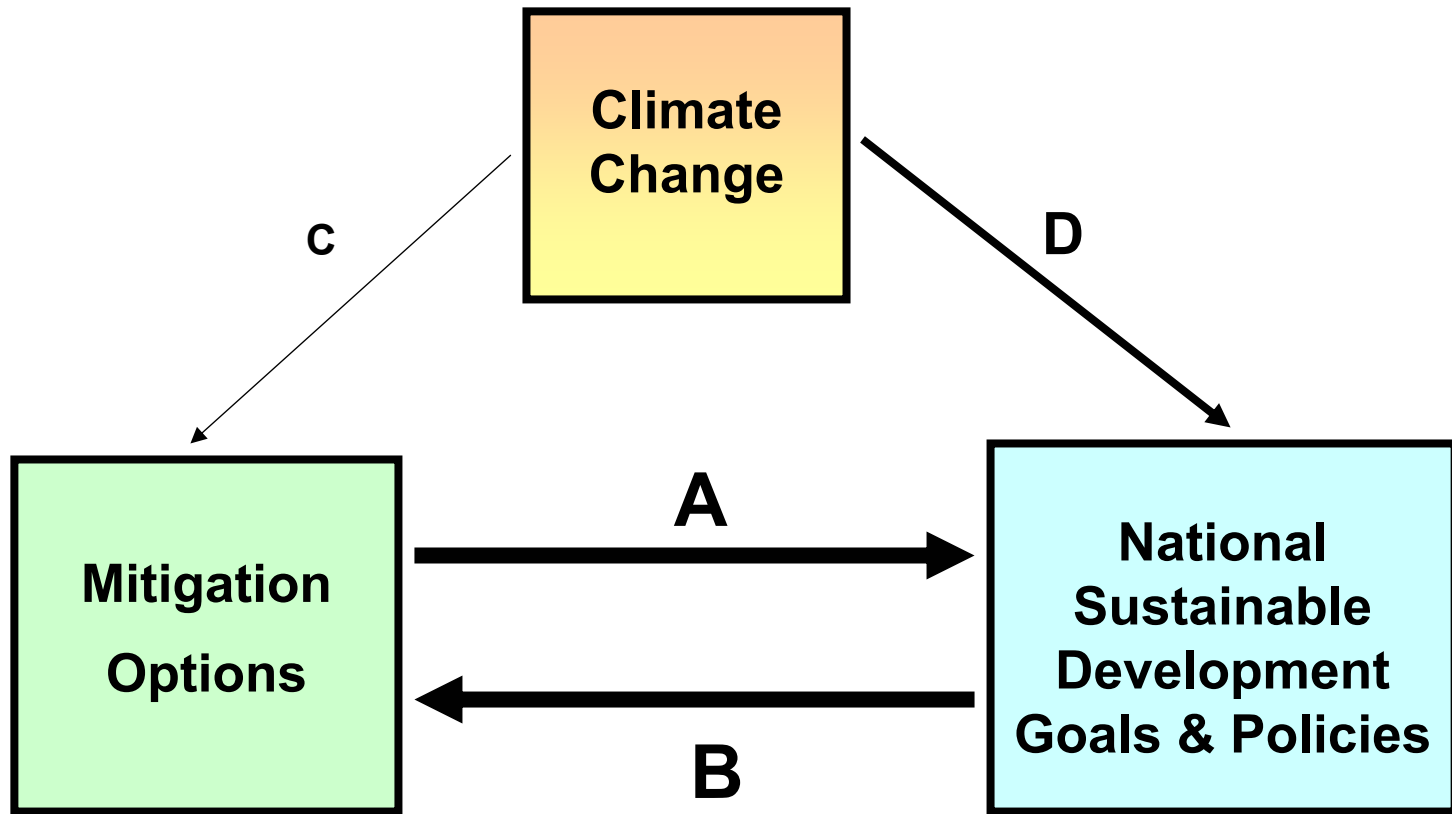
[-2] Loss: Economic growth will increase energy demand and emissions.

[+1] Gain: Growth and economic reforms will improve energy conservation



Mitigation AIM methodology

1. Determine the most important national goals and policies.
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Mitigation AIM methodology

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COUNTRY CASE STUDY **Climate Change Mitigation &** **Sustainable Development in Sri Lanka**

Recommended Policy Options for
Development in relation to Strategies
for Mitigation of GHG Emissions



Selected National Development Goals

- Economic Growth
- Poverty Alleviation/Rural Development
- Food Security
- Employment & Education
- Infrastructure
- Sustainable natural resource management
- Budget deficit reduction
- Good Governance/Public sector reforms
- Water/sanitation/Health

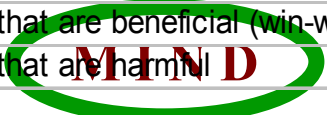


Mitigation Options

Sector	Option/Technologies
Energy/Electricity	Renewable Energy Demand Side management Supply Side Management Clean Technology
Transport	Efficient Technology Mobility Management
Industry	Pollution Prevention/Control Technologies Efficient Resource Utilization
Land Use	Reforestation including Agro Forestry



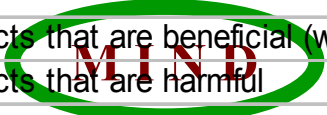
	Mitigation Options									CC Impacts
	Energy/ Electricity				Transport		Industry		Land use	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	Renewable energy	Demand Side Management	Supply Side Management	Clean Technology	Efficient Technology	Mobility Management	Pollution Prevention/Control Technologies	Efficient Resource Utilisation	Reforestation	(CC)
Development Goals/Policies (without CC Impacts) <=										
Economic Growth	-1	1	1	-2	-1	2	-1	1	1	-1
Poverty alleviation /rural development	2								1	-1
Food security (self reliance)									2	-2
Employment & education	1			-1	1				1	-1
Infrastructure						1				-2
Sustainable management of natural resources	1	1	1	1	1	1	2	1	2	-2
Budget deficit reduction	-1	1	1	-2	-1	1			-1	-1
Good governance										
Water and sanitation	1			1	1	1	1	1		-2
	3	3	3	-3	1	6	2	3	6	
Effects that are beneficial (win-win for both CC and SD)										
Effects that are harmful										



	Energy/ Electricity				Transport		Industry		Land use
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Renewable energy	Demand Side Management	Supply Side Management	Clean Technology	Efficient Technology	Mobility Management	Pollution Prevention/Control Technologies	Efficient Resource Utilisation	Reforestation

ent Goals/Policies (without CC Impacts) =>

Economic Growth	1	-1	1		1	1	1	-1	1
Poverty alleviation /Rural development	1								-1
Food security (self reliance)									-1
Employment & education								1	0
Infrastructure						2			
Sustainable management of natural resources	-1				1		1		2
Budget deficit reduction			-1	-2		-1			
Good governance									
Water and sanitation							1		
CC Impacts =>	-1								-1
	1	-1	0	-2	2	2	3	0	1
Effects that are beneficial (win-win for both CC and SD)									
Effects that are harmful									



Policy Options & Recommendations

TRANSPORT

Mobility management (including Traffic management), Quality and service improvement of road network, Public Transport, Non Motorized Transport, and Inter Modal Choice

- Mobility Management has positive impact on most of the development goals. The high costs to be offset by external funding for carbon benefits



Policy Options & Recommendations

Reforestation including Agro forestry

- Reforestation and agro forestry has positive impact on food security and sustainable management of natural resources and most of the other development goals
- Poverty alleviation and rural development programmes should not undermine reforestation efforts and agro forestry



Policy Options & Recommendations

Renewable Energy

- Significant impact on poverty alleviation especially through dendro power
- Rural development through access to energy and improvement in the quality of life
- More employment opportunities- dendro power

However in some cases sustainable management of natural resources is limiting the development of renewable energy resources, such as mini hydro in sensitive areas.

High cost of renewable energy to be offset by external funding for carbon benefits.



Policy Option & Recommendations

Note:

Clean Technologies such as LNG are good options for GHG mitigation. As the option is very costly it needs external funding



Sri Lanka

Areas/Needs for Research & Development

- Renewable Energy
- Clean Technology for energy/electricity
 - Social benefits of Dendro & other renewable energy sources in rural areas
 - Impacts of hydro on Sustainable Management of Natural Resources
 - Evaluation of the long-term impact on cost of supply and the effect on national economy and quality of life



Sri Lanka

Areas/Needs for Research & Development

- Efficient Technology for transport
Study on transport planning and mobility management
- Reforestation
Research for identification of different Carbon Sinks
Selection of appropriate type of species for reforestation and agro forestry



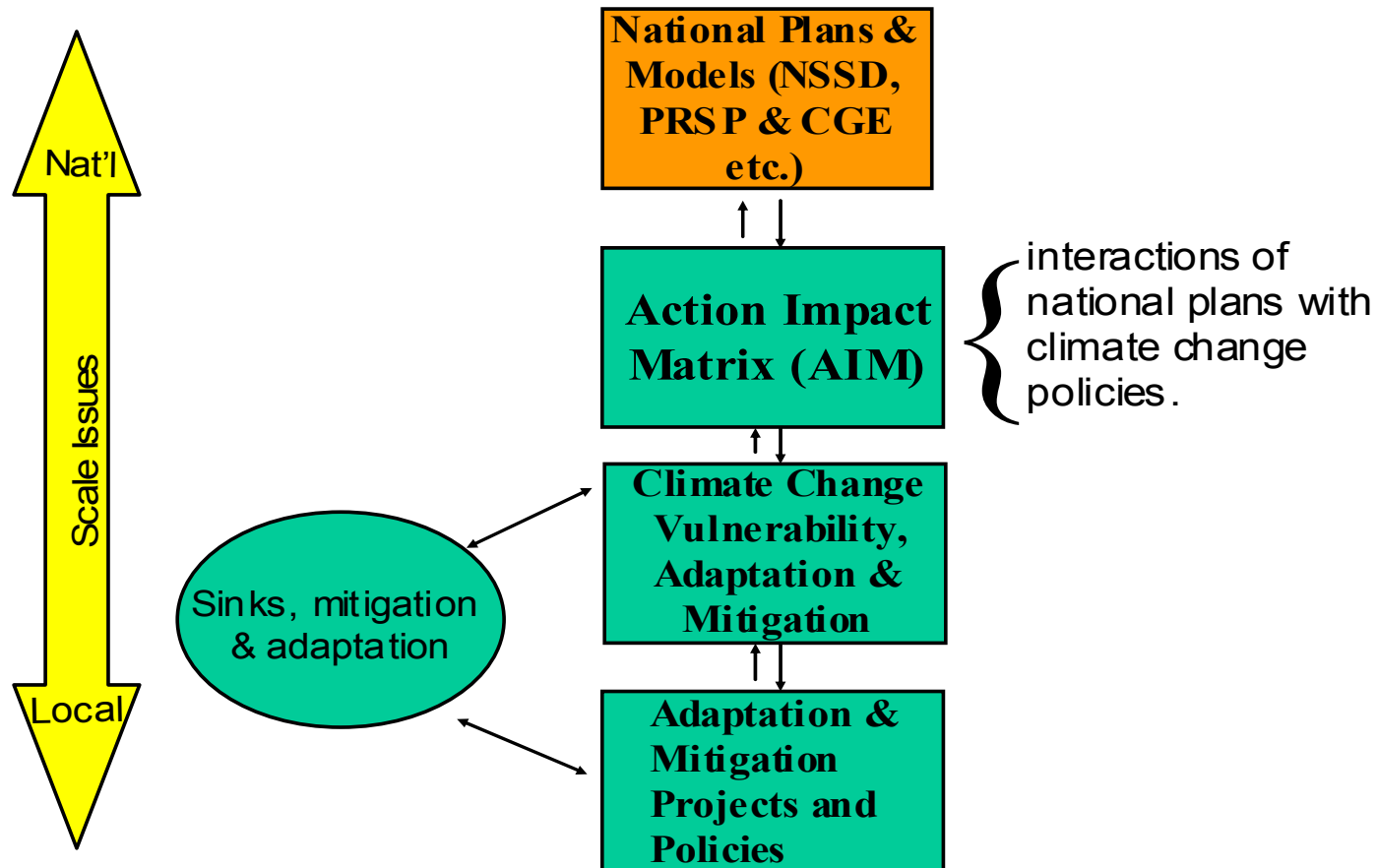
3. Post-AIM analysis of Macro- and Micro- Linkages

Examples:

- 1. CC-Macroeconomic analysis**
- 2. Mitigation project analysis**



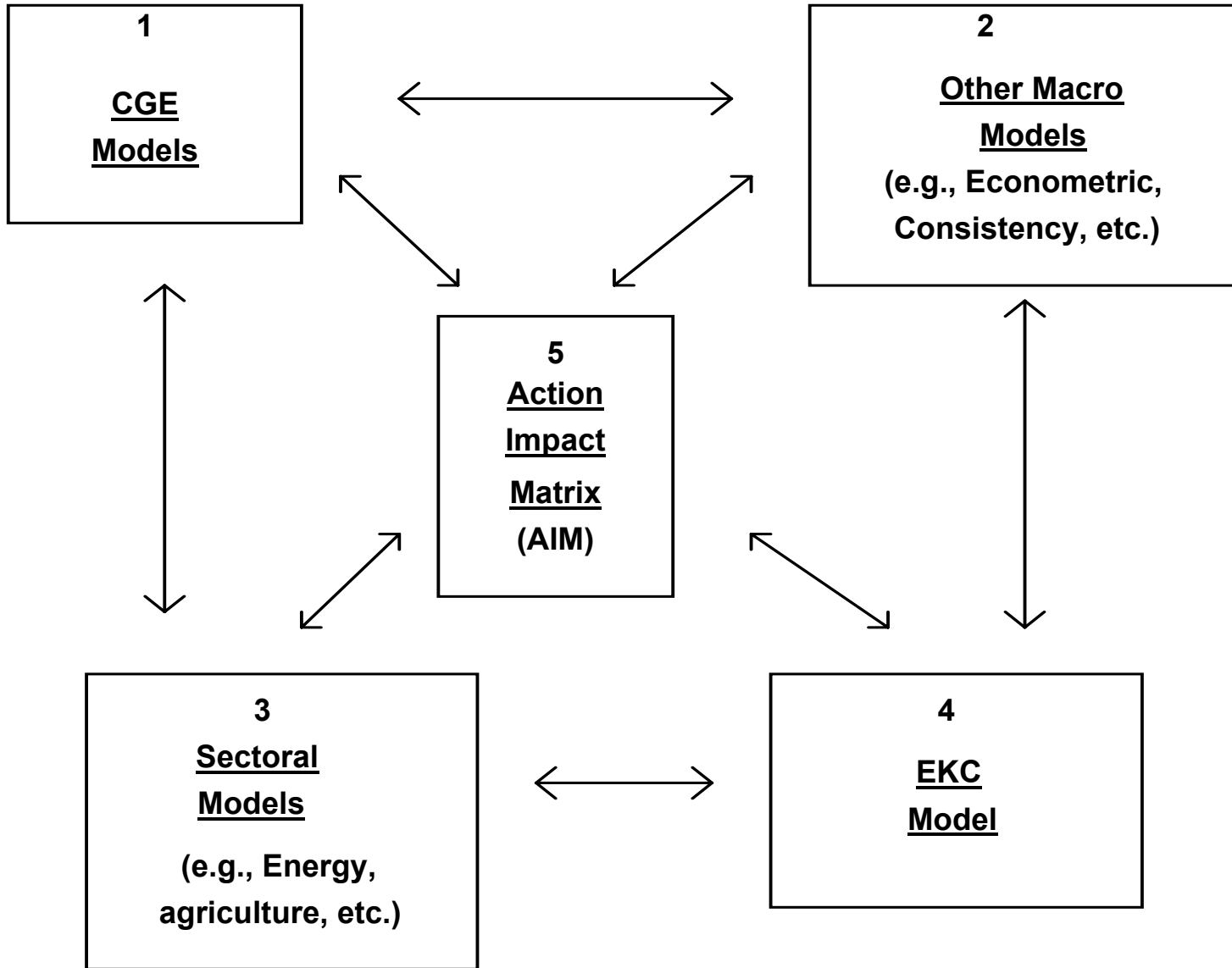
Assessing linkages between national development plans and climate policy (adaptation and mitigation) using the Action Impact Matrix (AIM)



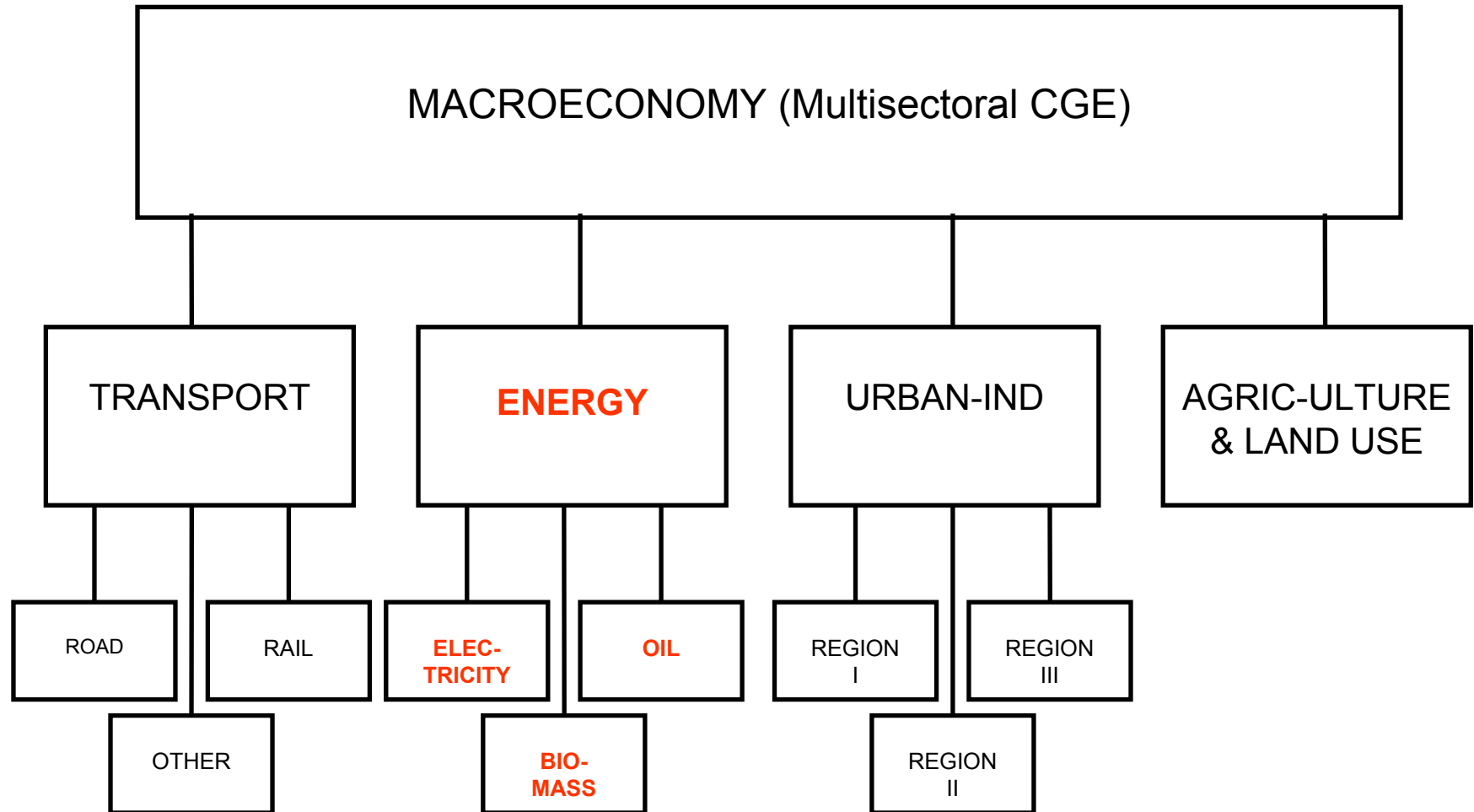
SD Analysis of Mitigation (and Adaptation)
at the Macroeconomic/Sectoral Level
(general equilibrium analysis)

1. Macroeconomic/Sectoral Modeling
2. Environmental and Macroeconomic Analysis
3. Poverty/Income Distributional Analysis



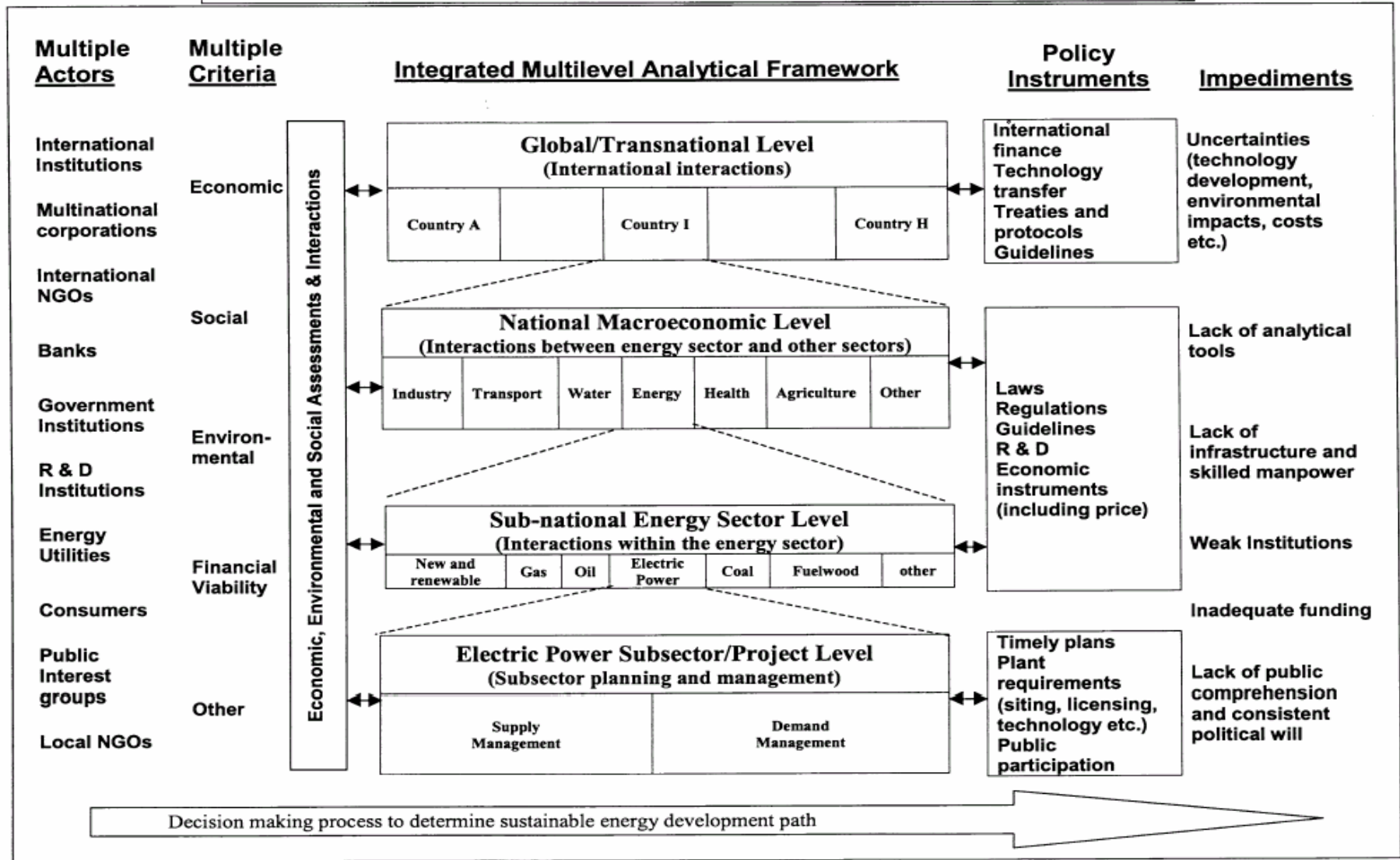


Sri Lanka Integrated Assessment Model Structure



Sustainable Energy Development and Mitigation

Figure 8. Framework for sustainable energy development Source: adapted from Munasinghe [1990].



Expanded National Income Accounts for SD

Social Accounting Matrix (SAM)



Economic Links

Basic
Input-Output
Table

Environmental- Economic Links

Satellite
Environmental
Accounts

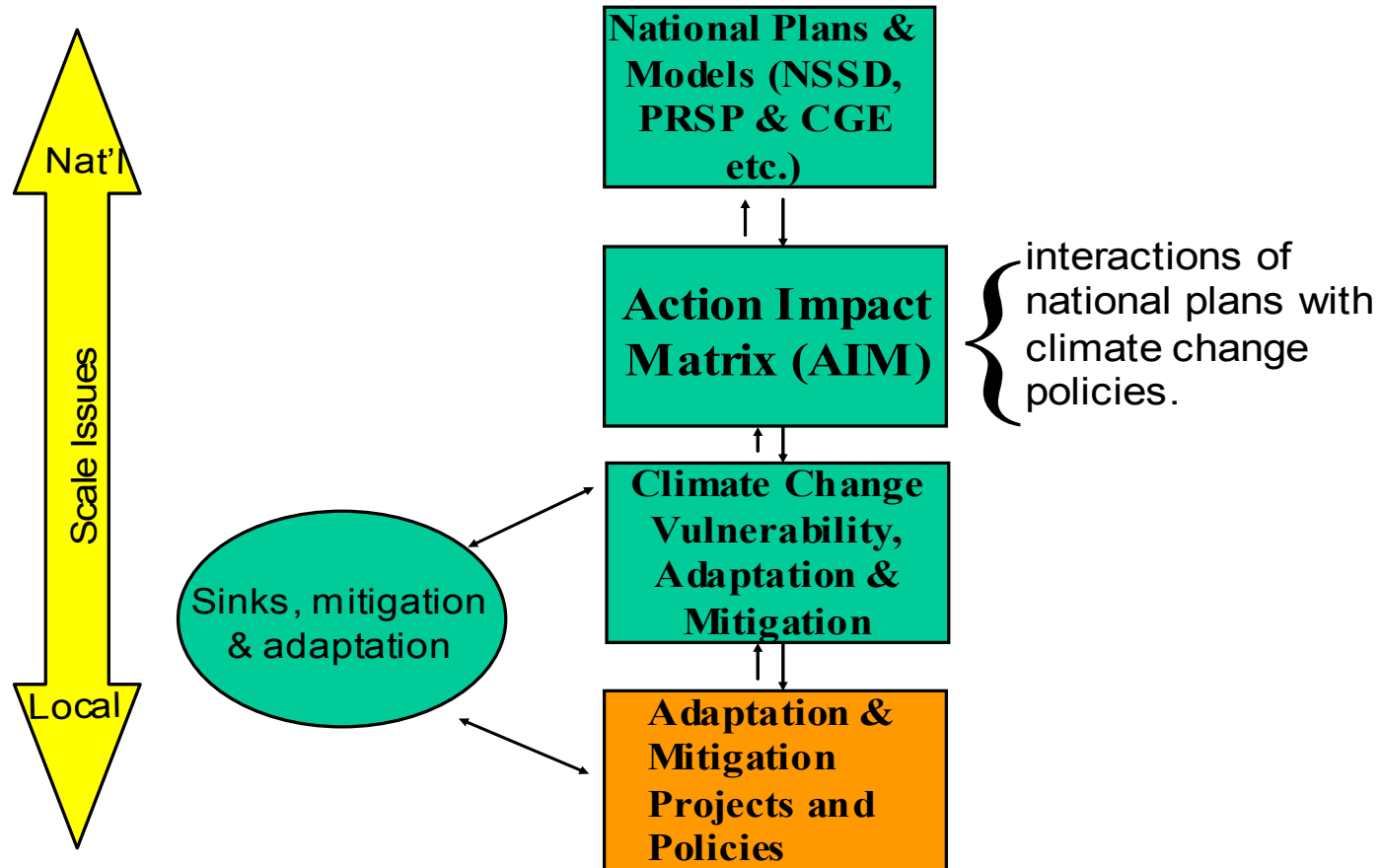
Economic-Social Links

Distribution of Income

Envir.-Social Links

Distribution of
Environmental
Impacts

Assessing linkages between national development plans and climate policy (adaptation and mitigation) using the Action Impact Matrix (AIM)



Sector/Project Level Sustainable Development Assessment (SDA) of Mitigation (and Adaptation)

- 1. Economic/Financial Assessment (CBA)**
- 2. Environmental Assessment (EA)**
- 3. Social Assessment (SA)**
- 4. Poverty Assessment (PA)**
- 5. Technical Assessment (TA)**
- 6. Multi-criteria Analysis (MCA)**

Choice of appropriate SD indicators is vital for SDA



Sectoral Level Example: Power System Planning in Sri Lanka using SD indicators

Source: Meier and Munasinghe (1994)



Energy sector level indicators used for assessment

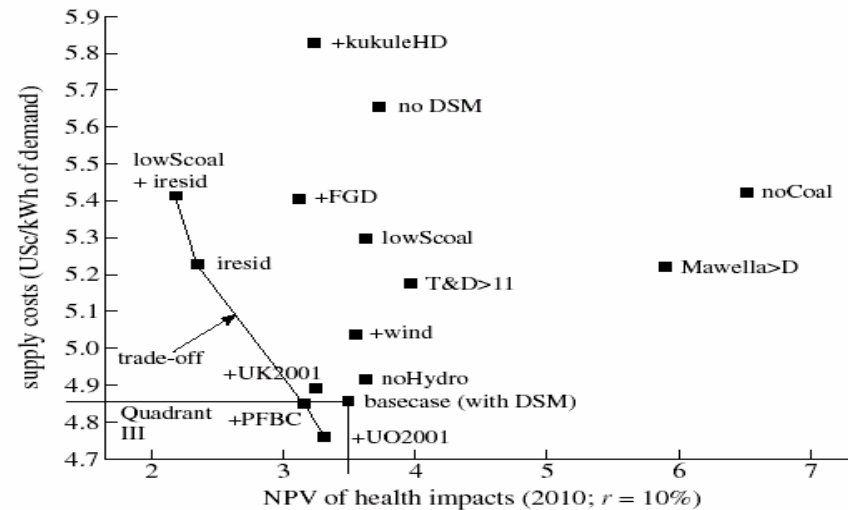
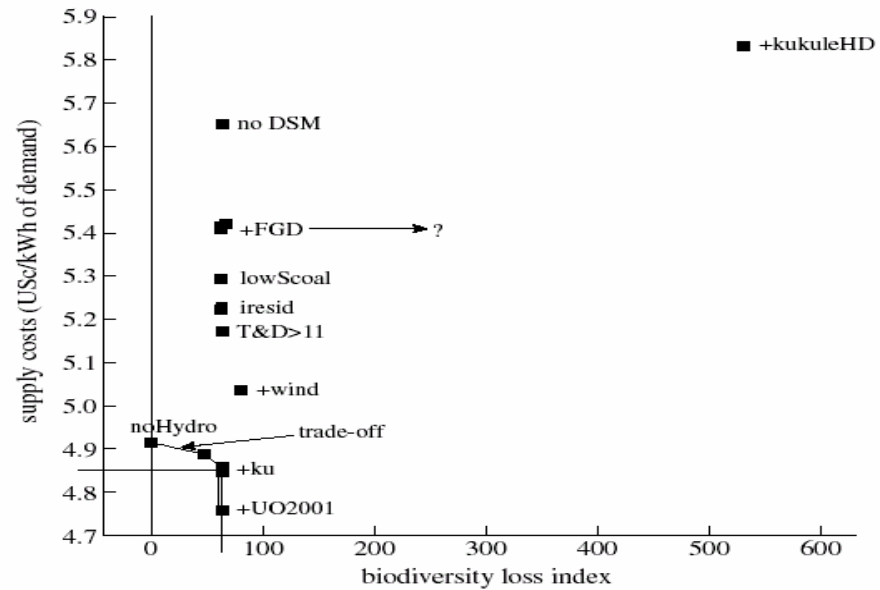
Impact	Indicator
Global Warming	CO2 emissions
Health Effects	Population weighted incremental ambient concentrations of fine particulates and NOX
Air Pollution	SO2 and NOX emissions
Social Impact	Employment creation
Biodiversity Impact	Biodiversity Index



Sectoral Level: Power System Planning in Sri Lanka

MCA with trade-off curves between economic costs and (a) biodiversity impacts; and (b) health impacts

Source: Meier and Munasinghe (1994)



Project Level Example

Assessing economic, social and ecological indicators of small hydro for climate change mitigation in Sri Lanka

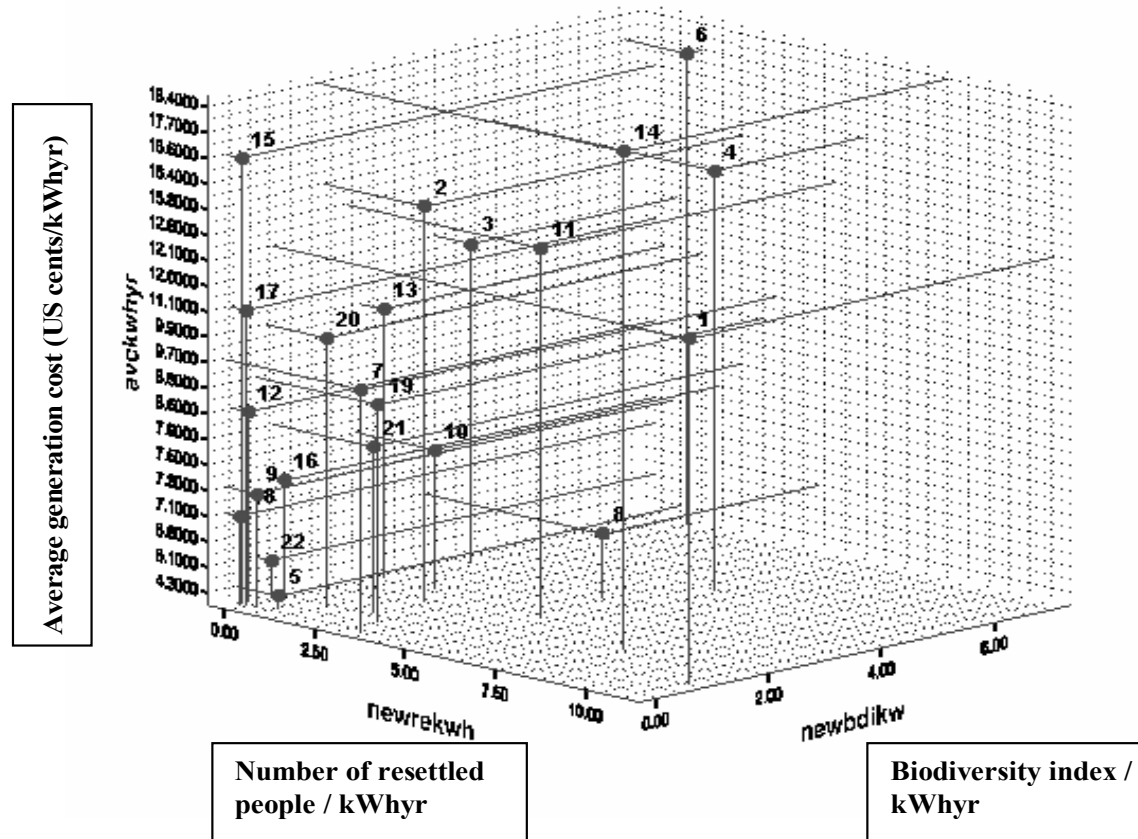
Primary Source: Morimoto R., and Munasinghe M. (2005) “Small hydropower projects and sustainable energy development in Sri Lanka”, *Int. Journal of Global Environmental Issues*, Vol.4.

Summary: Munasinghe, M. (2002) “The sustainomics trans-disciplinary meta-framework for making development more sustainable: applications to energy issues”, *Int. J. of Sustainable Dev.*, Vol.4, No.2, pp.6-54.

3-D MCA of SD indicators of small hydro for Mitigation (per unit of emissions reduced)

Figure 5. Three dimensional MCA of sustainable development indicators for various hydropower options.

Source: Morimoto, Munasinghe and Meier [2000]



Ancient Pali Blessing - MDMS

**“DEVO VASSATU KALENA
SASSA SAMPATTI HETU CA
PHITO BHAVATU LOKO CA
RAJA BHAVATU DHAMMIKO”**

**“May the rains come in time,
May the harvests be bountiful
May the people be happy and contented
May the king be righteous”**

Even in ancient times, a favourable environment, economic prosperity, social stability, and good governance, were well recognised as key factors for making development more sustainable.

Suggestions for Further Information

1. **Munasinghe, M. (2002) ‘The sustainomics trans-disciplinary meta-framework for making development more sustainable: applications to energy issues’, *International Journal of Sustainable Development*, Vol. 4, No.2, pp.6-54.**
2. **Munasinghe, M., and Swart, R. (2005) *Primer on Climate Change and Sustainable Development*, Cambridge University Press, UK.**
3. **Meier, P., and Munasinghe, M. (2005) *Sustainable Energy in Developing Countries*, Edward Elgar Publishers, UK.**
4. **MIND (2004) *Action Impact Matrix (AIM) Guide*, Munasinghe Institute for Development, Colombo, Sri Lanka.**
5. **Website URL: <www.mindlanka.org>**



Climate Change Capacity Development (C3D)

Assistance to developing countries to build capacity for better understanding, analysing and negotiating climate change issues

Partners

ENDA, Dakar, Senegal – Vulnerability & Adaptation Module

ERC, Cape Town, South Africa – Mitigation Module

MIND, Colombo, Sri Lanka – Climate Change & Sustainable
Development Module

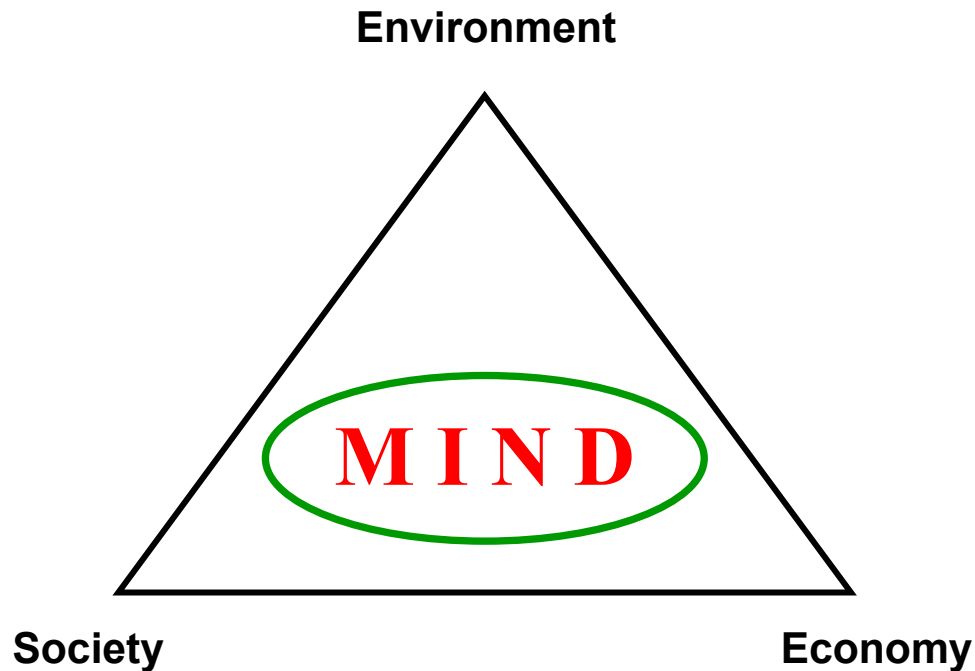
UNITAR, Geneva, Switzerland – Coordination & Management

Ongoing Activities

- Training programme development (tools and methods like AIM)
- Development/implementation of “Training of Trainers programme” by regional centres



An Introduction



Munasinghe Institute for Development

"making development more sustainable - MDMS"

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E-mail: <MIND@Eureka.Lk> ; Web: <www.mindlanka.org>

MIND

Munasinghe Institute for Development

MIND Objectives

MIND was established in the new millennium as a **private, non-profit organization**, to play a key role in nurturing communities of stakeholders and scholars to address major issues of **Sustainable Development (SD)** world-wide.

MIND provides a forum for stakeholders to understand the multi-dimensional nature of sustainable development, especially the **SD triangle – based on social, economic, and environmental aspects**. We promote balanced consideration of these three key dimensions.

MIND believes in the application of scientific knowledge to **make development more sustainable (MDMS)**. We are committed to strengthening the linkages amongst **civil society, the private sector and government**,



Xie Xie

**Thank You
Very Much**

